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FACTORS AFFECTING SOVIET
MISSILE PRODUCTION AND DEPLOYMENT

(CIA/AFCIN CONTRIBUTION TO GMAIC for NIE 11-5-59)

CIA/FR MP 59-27

(ORR Project No. 30.2203)

11 August 1959

CENTRAL INTELLIGENCE AGENCY
Office of Research and Reports

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I. Present Status of Soviet Missile Production ProgramsA. General

The present status of Soviet missile production programs is estimated as shown in the following table:

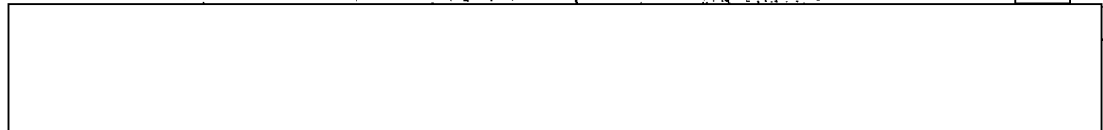
<u>MISSILE SYSTEM</u>	<u>CURRENT PRODUCTION STATUS</u>	
	<u>R & D Prototypes</u>	<u>Serial Production</u>
<u>Ground-Launched</u>		
SS-1		X
SS-2		X
SS-3		X
SS-4		X
SS-5		X
SS-6		X
SA-1		Production concluded
SA-2		X
SA-3	X	
SA-4	X	
<u>Air-Launched</u>		
AA-1		X
AA-2		X
AA-3		X
AA-4	X	
AS-1		X
AS-2	X	
<u>Naval-Launched</u>		
SS-Y (Cruise-type, 15-40 n.m. destroyer-launched)		X
SS-7		X
SS-X (Ballistic, 200 n.m. sub-launched)		X
SS-8	X	
SA-6	X	
SA-7	X	

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B. Surface-to-Surface Missiles

We believe that the USSR has the industrial capability to produce in quantity a wide variety of ballistic missiles, including the ICBM. The USSR has already demonstrated that it possesses the industrial and scientific skills, facilities and resources to carry out an extensive and, on the whole, highly successful missile test program which has expended large numbers of ballistic missiles over many years. Direct evidence on the serial production and operational deployment of ballistic missile systems continues to be virtually nonexistent.



We regard the status of individual Soviet surface-to-surface ballistic missile production programs to be as follows:

A. SS-1 to 3 (350 n.m. and less)

There is evidence that operational production of a short-range ballistic missile (SS-2), similar in range and characteristics to the German V-2 type, may have begun as early as 1951 at the former Dnepropetrovsk Automotive Plant No. 186 although we have no knowledge of the current status of the production program for this missile. We estimate that operational production of a 350 n.m. ballistic missile (SS-3) and a shorter range (up to 100 n.m.) ballistic missile (SS-1) began in 1954. There is, however, no direct evidence on the current status of, or facilities related to, serial production programs for the SS-1 and SS-3 missile systems.

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2. SS-4 (700 n.m.)

Operational production of the 700 n.m. missile is estimated to have begun in late 1956.

The current status of the production program for this missile is unknown.

3. SS-5 (1,100 n.m.)

Deliveries of 1,100 n.m. missiles are estimated to have begun at the end of 1958 or early 1959. Available evidence, supported by known philosophy, practices, and organization of Soviet missile production, leads to the belief that Plant No. 186, Dnepropetrovsk is the final assembly facility for the 1,100 n.m. missile. There are also limited indications suggesting that a plant in Stalingrad is involved in the production of a major component for this missile, possibly engines.

4. SS-6 (ICBM)

In the light of Soviet military requirements for improved long-range attack capabilities, substantial progress in the nuclear weapons field, and probable Soviet awareness as early as 1954-1955 that U.S. ICBM development was being undertaken seriously, we must conclude that the USSR probably placed a very high value, and corresponding priority, on the attainment of an initial ICBM capability at the earliest practical date. These factors, in turn, would have governed the Soviet philosophy and approach toward the serial production and operational deployment aspects of this program.

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Soviet planners undoubtedly recognized that an early operational ICBM capability could not be acquired unless many basic decisions regarding serial production and operational deployment were made well before all technical aspects of the system had been fully proven. Prior to the initial flight tests in 1957, considerable planning would have taken place which would form the basis for subsequent decisions. With the required lead times probably on the order of 12-18 months, the USSR has had ample time to organize serial production of ICBMs as well as complete the preparation of some launching facilities.

There have been several official Soviet statements which alleged that the Soviet ICBM had been placed into serial production and was in the hands of military units by early 1959. Although these statements cannot be substantiated by direct evidence, they are, nevertheless, consistent with a logical Soviet course of action.

Because of the prior planning for production and deployment which must have accompanied the earlier developmental phases of the ICBM program, together with our belief that a high priority has been accorded this program, we conclude that the decision to organize the serial production and preparation of launching facilities probably was made concurrently with or shortly after the initial ICBM test flights and orbiting of Sputniks I and II. Although technical difficulties have undoubtedly occurred during the testing program, we do not believe,

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on the basis of current evidence, that these difficulties have been of sufficient magnitude to interrupt or delay significantly the build up toward serial production and deployment.

For the reasons outlined, we believe that from among alternatives, and in the absence of direct evidence to the contrary, we must estimate that by early 1958 the USSR probably had begun to commit resources to serial production and the preparation of some launching facilities. On this basis the first deliveries of serially produced ICBMs to the military forces could have commenced in early 1959. By mid-1959 serial production rates would still have been quite low, perhaps on the order of several per month, and, at most, only a few ICBMs would have been on launchers.

No production facilities have, as yet, been positively identified with ICBM production. There is some indirect evidence, however, which suggests that, in addition to Moscow developmental facilities, facilities in Sverdlovsk and Kuybyshev may be engaged in major aspects of the ICBM program.

C. Surface-to-Air Missiles

There is considerably more information, []

[] on the production aspects of the early Soviet surface-to-air missiles than on any other Soviet system. Production of operational missiles for the single stage surface-to-air missile (SA-1) deployed at the sites around Moscow is believed to have begun in early 1953, and the USSR apparently committed resources to serial production of this system well before all technical aspects of the system had been

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proven fully.

Plant No. 301, Khimki,

was engaged in R & D prototype production in mid-1951. By the end of 1951, Plant No. 82, Tushino and possibly Plant No. 464, Dolgoprudnaya were producing production-engineered missiles for the test program at Kapustin Yar. Stabilization and control components, including gyro assemblies for the SA-1, were produced at the Moscow Aircraft Instrument Plant No. 122.

this plant, although

not operating at full capacity, was producing 100 sets of controls per month in 1953. The missile timer was produced at Moscow Clock Plant No. 2. Plant No. 567, an electronics plant in Moscow, was reported to have been producing a missile guidance package

Missile transport and

erector equipment for the SA-1 were probably produced at the Moscow Factory "Mashinostroitel" and at Plant No. 292, Saratov.

Production of panels for the coordinates cabinet of the B-200 system, electronics ground environment for the SA-1, was reported at Plant No. 304, Kuntsevo. Relays and transmitters for the B-200 system were produced in plants in Leningrad.

The initial observation of possible SA-2 (Guidelene) deployment at the Moscow sites in mid-1958, and the estimated time-phasing of the SA-2 system, have led to the conclusion that SA-1 production probably had ceased by 1956. We believe that the production of the SA-2 missile, as well as the production of subassemblies and component parts, would probably take place at the former SA-1 production facilities because of the apparent relationship between the two missiles.

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The SA-2 missile appears to be a development resulting from the 32B missile Integrated structurally in the 32B missile were many of the same basic components used in the V-301 (SA-1).

SA-2 production for operational users was probably undertaken simultaneously with the phasing out of the SA-1 production program in 1956. Having acquired considerable experience in surface-to-air missile system production with the SA-1 missile, we believe that the USSR would not have encountered serious production difficulties with the SA-2 system. There is evidence to indicate that sites employing the SA-2 missile have been emplaced at several locations in the USSR, and are now being constructed in East Germany. We conclude that the SA-2 system has probably been under continuous production since early 1957 and probably is now available for the defense of a relatively large number of key Soviet targets, as well as for deployment with Soviet ground forces.

D. Air-to-Air Missiles

While we have no direct evidence that the USSR is now producing and deploying air-to-air missiles, there have been indications since World War II of the existence of a Soviet air-to-air program. Considering the military need for such systems and the known Soviet technical capabilities, it is estimated that there are several air-to-air systems in operational production at the present time. The USSR has produced and has available substantial numbers of fighter aircraft, airborne intercept radars, and associated early warning and

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ground control intercept systems which would represent the major portion of the investment necessary to achieve an extensive operational capability with air-to-air missile systems.

Generally, there are no significant factors which would limit or materially delay an air-to-air missile production program. The earlier air-to-air missile programs would require relatively minor modifications of existing Soviet aircraft. Although the more sophisticated air-to-air systems estimated to be available later in the time period would require specially designed aircraft, it is expected that these would be designed and produced simultaneously with the missiles and associated equipment.

E. Air-to-Surface Missiles

We believe that the 55 n.m. air-to-surface missile, AS-1, entered series production in 1956 and continues to be in production at the present time. There is some evidence that the First Experimental Plant at Podberezh'ye and Plant No. 118 in Moscow may be engaged in this program. The primary director-bomber for this system is believed to be the Badger jet medium bomber, which the USSR has produced in considerable numbers. Production of the associated navigation and electronic guidance equipment for this system should not impose serious production problems on the Soviet electronics industry.

F. Naval Missiles

There is no direct evidence of production or production facilities devoted to naval-launched missiles at the present time.

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it would appear that the Soviets have produced at least limited quantities of hardware for several naval missile systems. Statements in the Soviet press by high level officials would also support this conclusion.

the SS-7 (200 n.m. cruise type) is estimated to have become operational sometime in 1955-1956. It is believed, however, that only a limited number of submarines have been equipped with this missile. Therefore, present production of the SS-7 missile probably would be limited to production for stockpile maintenance and testing.

There is some evidence revealing the existence of a Z-class submarine modified to launch missiles. It is estimated that this submarine carries the SS-X (200 n.m. ballistic type) missile and that this missile will be used in the first Soviet nuclear guided missile submarine. On this basis the SS-X missile would be currently in production for operational use.

identified Soviet guided missile destroyers in two fleet areas. These vessels are apparently attached to operating fleet units and are estimated to be armed with a 15 to 40 n.m. cruise type missile, the SS-Y. This missile is therefore estimated to be in production for operational use at the present time, although the scope and character of the program are not known.

XI. Economic Implications of Soviet Missile Production Programs

Quantity production and deployment of guided missile systems in the USSR will involve directly the facilities, resources and manpower

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of a great many industrial sectors of the Soviet economy. The most significant requirements of the missile industry lie in fields such as specialized metals, machinery, electronics and electrical equipment, precision instruments, chemicals and chemical equipment, and railroad equipment. In addition, the missile industry makes substantial demands for various economic services, such as transportation, construction and communications.

For the most part, the requirements of the missile industry can probably be met by existing Soviet industrial facilities, after the necessary expansion or conversion of individual installations, although some new construction might be undertaken to meet the needs for final assembly, engine, and engine test facilities for the larger ballistic missiles. The limited evidence which is presently available suggests that converted facilities are being used for Soviet missile production and that these facilities have been selected from several different industries. Immediately after World War II, for example, the Soviets centered the V-2 assembly program in an arms plant and the engine program in an airframe plant which became disassociated from the aircraft industry. In 1952, the Soviets placed their surface-to-air missile fabrication and assembly in two former airframe plants. At the same time, a motor vehicle plant was probably being used for ballistic missile assembly.

The extent to which the Soviet missile production and deployment program competes with other Soviet objectives, as well as the likelihood of shortages of critical resources, products or manpower which

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might delay seriously the program, will be determined primarily by the size and pace of the program the USSR attempts to carry out. Once missile systems have been developed to the point of becoming available for series production, the problems associated with their production in quantity are not unlike those involved in the production of any other new and complex mechanism. These are principally concerned with the lead times required, the organization of the production processes, the coordination and time-phasing of the production efforts of several hundred participants, and feasible rates of production build up. All of these factors will have been taken into account and worked out in detail by Soviet planners well before production actually begins, and the entire missile production program will have been integrated with other Soviet industrial and military programs and requirements. Similarly, basic decisions will have been made with respect to the priority to be accorded the missile program relative to other programs, and the extent to which other activity might have to be curtailed if the missile objectives are to be met.

While there will undoubtedly be problems and difficulties within individual missile production programs, it is doubtful that shortages or bottlenecks will exist which, given the high priority of the missile program, would delay production for any significant time period. We believe that the USSR possesses the necessary industrial skills and material and human resources to produce missiles, launching, handling and support equipment in quantity and that in general the USSR can probably achieve any missile production goal which Soviet leaders have

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selected as feasible without encountering insurmountable difficulties. Only in the event of a very large production program compressed into a brief time period, particularly with respect to the ICBM, would the USSR be likely to experience production problems of sufficient magnitude to jeopardize success of the program.

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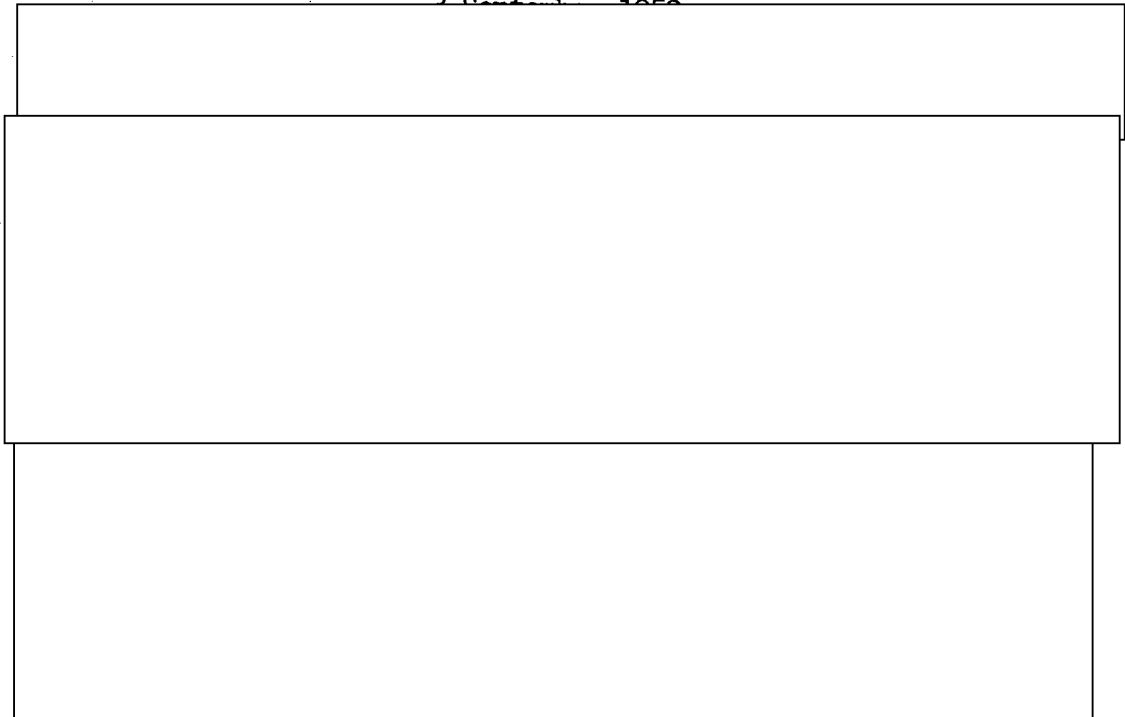
FACTORS AFFECTING SOVIET
MISSILE PRODUCTION AND DEPLOYMENT

(Supplementary CIA/AFCIN Contribution to
GMAIC for NIE 11-5-59)

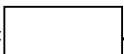
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CLASS. CHANGED TO: TS S C
NEXT REVIEW DATE: 2010
AUTH: HR 70-2
DATE: 10/6/80 REVIEWER: 

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FOREWORD

This paper contains estimates of the present status of the Soviet production programs for ICBMs and surface-to-air missile systems. These statements have been prepared at the request of the Chairman, GMAIC, and are intended to replace Sections I.B.4 and I.C., respectively, of the CIA/AFCIN contribution to GMAIC for NIE 11-5-59 dated 11 August 1959.

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4. SS-6 (ICBM)

Our estimate of the status of the Soviet ICBM production program is based on indirect evidence [REDACTED]

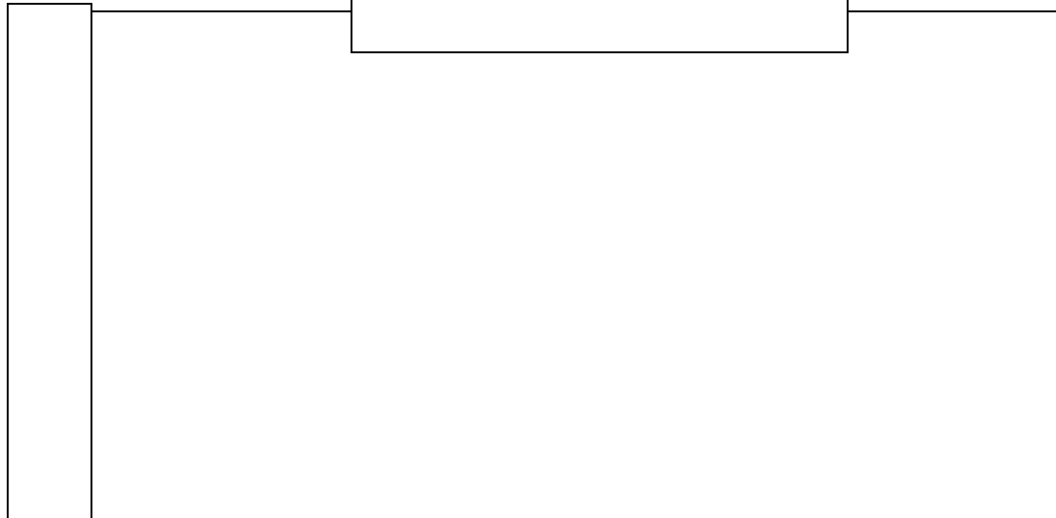
[REDACTED] various statements of Soviet leaders on the status of the ICBM program, our knowledge of Soviet industrial programs and practices, and our belief that the Soviets are following an orderly and effective ICBM program intended to acquire a substantial capability at the earliest reasonable date.

There is evidence that, in addition to Moscow, the city of Sverdlovsk is a center of some activity of major significance to the Soviet ICBM and/or space flight programs and that this activity probably began in early 1956. [REDACTED]
[REDACTED]

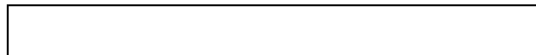
[REDACTED] This information indicates that Sverdlovsk has been closely linked to the Tyuratam Missile Test Range since early 1957 (before the range was activated), that there has been a continuing and growing association between Sverdlovsk and Tyuratam throughout this period,

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[REDACTED]

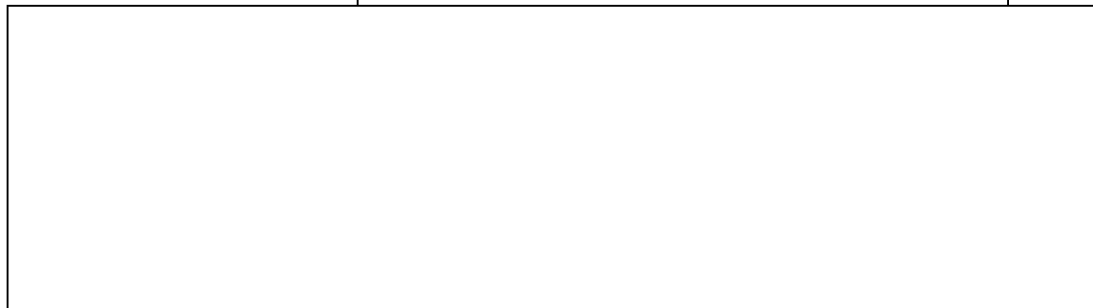
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This conclusion is generally consistent with information [redacted]
[redacted] that missile production began
at armaments plant No. 8 in Sverdlovsk in early 1957 and reached
the serial production stage in 1958. The latter information,
however, reportedly concerned a medium or intermediate range
ballistic missile, whereas [redacted] clearly indicate the
involvement of Sverdlovsk in the ICBM/space program at Tyuratam.



There is also evidence [redacted] that a second
city, Kuybyshev, may be engaged in some major aspect of the Soviet
ICBM/space program. [redacted]



[redacted] As in the
case of Sverdlovsk, there also appears to be an association between

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Kuybyshev and Dnepropetrovsk, which began in late 1956.

If our belief is correct that the activity at Sverdlovsk and possibly at Kuybyshev is concerned with ICBM production, either of the missile or some major component, the dates at which this activity began would reflect an early Soviet decision to establish their production facilities. Moreover, the timing of this activity is entirely consistent with the statements made by Soviet leaders in the past year regarding the status of the Soviet program. Notable among these have been the official statements dealing with ICBM production made by Khrushchev in late 1958 and early 1959. In November 1958, Khrushchev stated that "in the Soviet Union the production of intercontinental ballistic rockets has been set up successfully". In February 1959, in discussing the final draft of the Seven Year Plan before the 21st Party Congress, this wording was altered to state: "In the Soviet Union the serial production of the intercontinental ballistic rocket has been organized". In his concluding remarks to the Party Congress a few days later, Khrushchev added this statement: "When we say that we have begun serial production of intercontinental ballistic missiles, it is not just to hear ourselves talk. And we do not say this to threaten anyone, but in order to clarify the true state of affairs".

Another important statement was made by Malinovsky at the Party Congress. He stated: "We joyfully applaud our scientists, engineers and technicians, all the workers and toilers who created the cosmic Soviet rocket and who have equipped the armed forces with a whole series of military ballistic rockets of intercontinental,

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continental, long, medium, and short-range".

We are unable to determine from the foregoing the specific production philosophy the USSR has selected for production of its ICBM system, nor can this be judged from examining either [REDACTED] [REDACTED] at Tyuratam or past Soviet practices. Further, there is nothing in official Soviet statements which implies the production rates anticipated in the future, or the over-all stockpile objective the USSR may have established for this system. Regardless of the production concept and the over-all program objective, however, we believe that the USSR has had ample time to organize and initiate serial production of ICBMs and that the first such missiles could have been delivered to operational units.

Two basic production philosophies might be employed by the USSR. (For comparison, these philosophies would correspond roughly to the US Atlas, Titan and Thor programs on the one hand, and to the Jupiter on the other.) The first of these assumes that a basic decision would be made very early in the programs that quantity production and operational deployment was a definite objective which would be implemented as soon as possible. It would, therefore, call for committing resources to future serial production and operational deployment from the beginning of the program. All production, whether for research and development or for operational purposes, would take place at the same facility or facilities, with the first missiles and equipment coming off production lines being designated for initial developmental testing and firing, and the later missiles and equipment being earmarked

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for delivery to operational units. The alternative concept calls for production of initial research and development hardware at a special facility or design bureau, with a separate facility (or facilities) organized and tooled for serial production at a later date.

Both of these alternative philosophies are consistent with known Soviet industrial practice in producing modern weapons systems. We have firm evidence, for example, that in their V-301 surface-to-air and shorter range ballistic missile programs, the Soviets have organized their developmental and quantity production programs in separate facilities. In both cases, however, the development facility supplied precision design drawings to the production facility prior to a system or even missile flight test program. Thus the serial production facilities were started up and tooled at an early stage and in fact appear to have provided many of the missiles used in the research and development test programs. This concept of concurrent development and serial production facilities, therefore, permits reductions in lead times in much the same manner as the single facility concept. Under either concept, the principal distinction between serial production and earlier production phases is the intended use of the missiles produced--i.e., serially produced missiles are intended primarily for delivery to operational units rather than test firing or other developmental purposes. Moreover, short of major difficulties in the test program which affect the basic design of the missile system, the pace and scale of the parallel serial production

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is not significantly affected by test range results. In the Soviet aircraft industry there are numerous examples of the other alternative wherein plants producing the prototypes of bomber aircraft subsequently carried the aircraft directly into serial production. In some cases second and third plants tooled up and went into serial production in parallel with the lead plant.

Soviet planners undoubtedly recognized that an early operational ICBM capability could not be acquired unless many basic decisions regarding serial production and operational deployment were made well before all technical aspects of the system had been fully proven. Prior to the initial flight tests in 1957, considerable planning would have taken place which would form the basis for subsequent decisions. In accordance with our belief that the USSR intends to acquire a substantial capability at the earliest reasonable date, we conclude that the decision to organize serial production and preparation of launching facilities probably was made concurrently with or shortly after the initial ICBM test flights and Sputnik I and II launchings. Although technical difficulties have undoubtedly occurred during the testing program, we do not believe, on the basis of current evidence, that these difficulties have been of sufficient magnitude to interrupt or delay significantly the build up toward serial production and deployment. With the required lead times probably on the order of 12-18 months, the USSR has thus had ample time to organize serial production of ICBMs, as well as to complete the preparation of some launching facilities.

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We consider that an initial operational capability (IOC) with, say, 10 missiles marks the beginning of the planned build up of the intended operational force and represents the first of a series of deployed, fully operational ICBM units, rather than a capability established primarily for final proving of all elements of the missile system and for troop training and familiarization purposes. Accordingly, we consider it highly probable that the Soviet IOC will be (or has been) established with serially produced missiles, rather than prototypes. The lead time required from the production of the first missile intended for an operational unit to the deployment of 10 operational missiles on site would probably be on the order of 6-9 months, taking into account slow initial rates of production build up and diversion of some missiles to other uses, transportation and handling times, depot checkout requirements, and emplacement of the operationally approved missiles on launchers. As a result, even if the IOC does not occur until well into 1960, it is probable that series production is already underway, in the sense that one or more missiles intended for operational use have been produced at the final assembly facility. On the other hand, if the IOC has already occurred or is about to occur, series production must have started in late 1958 or early 1959.

In view of the Soviet statements on the status of the program and the early dates suggested by our indirect evidence and our knowledge of Soviet philosophy, together with the high priority which we believe the USSR attaches to attainment of an early substantial capability, we must estimate that by late 1957 or early

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1958 the USSR had begun to commit resources to serial production and the preparation of some launching facilities and that serial production of ICBMs probably was underway by early 1959. By mid-1959, serial production rates would still have been quite low, perhaps on the order of several per month, and, at most, only a few ICBMs would have been on launchers.

C. Surface-to-Air Missiles

There is virtually no current evidence on the production of surface-to-air missiles for operational deployment in the Soviet Union and the Satellites. The missile currently being deployed in both the Soviet Union and East Germany has been estimated to be the same missile as that appearing in the November 1957 Moscow parade. No production information on this missile (designated Guideline), or on the twin-boosted version reported in late 1958, is available. In the summer of 1958, the Guideline missile was also reported on the ring road near one of the Moscow herringbone sites.

To date there has not been a [REDACTED] report conclusively demonstrating the presence or sighting of a known and recognizable Soviet surface-to-air missile [REDACTED]

It has been estimated, however, that the V-301 (SA-1) missile [REDACTED]

[REDACTED] was deployed on the Moscow sites beginning in mid-1953. There is considerably more information, [REDACTED] on the production program organization for the B-200 electronic ground environment and the V-301 missile than on any other Soviet system. The USSR

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[redacted]
is known to have committed production facility resources to this program well before all technical aspects of the system had been proven fully.

[redacted] Plant No. 301, Khimki was engaged in R & D prototype production of the V-301 missile in mid-1951. By the end of 1952, Plant No. 82, Tushino and a second production plant, probably Plant No. 464, Dolgoprudnaya were producing production-engineered missiles for the flight test program at Kapustin Yar. At the same time the Soviets were testing the solid boosted 32B missile which [redacted] contained many of the same basic control components as the V-301, structurally integrated into the newer missile.

Stabilization and control components, including gyro assemblies for the V-301 missile, were produced at the Moscow Aircraft Instruments Plant No. 122. The missile timer was produced at Moscow Clock Plant No. 2. Plant No. 567, an electronics plant in Moscow, was reported to have been producing a missile guidance package [redacted] Missile transport and erector equipment for the Moscow herringbone sites was probably produced at Moscow Factory "MASHINOSTROITEL" and at Plant No. 292, Saratov. Production of panels for the coordinates cabinet of the B-200 system, electronic ground environment for the SA-1, was reported at Plant No. 304, Kuntsevo. Relays and transmitters for the B-200 system were produced in plants in Leningrad.

It has been estimated that the B-200 electronic ground

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environment and the V-301 missile were produced for deployment on the Moscow herringbone sites, although the V-301 missile has never been identified on any of the sites. It is believed that the 32B missile was not placed in production for operational deployment and may have been a development forerunner of the later Guideline missile.

It is estimated that the SA-2 Guideline missile probably went into production in 1956 and probably was first deployed in the USSR in 1957. We believe that the production of the SA-2 missile, as well as the production of subassemblies and component parts, would probably take place at the former SA-1 production facilities. Having acquired considerable experience in surface-to-air missile production with the SA-1 missile, we believe that the USSR probably would not encounter serious production difficulties with the SA-2 missile.

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